

## CLAIMS

1. A method of reducing NOx in exhaust gas emissions from a diesel engine having variable volume combustion chambers with intake and exhaust valves and an intake manifold connected with the combustion chambers through the intake valves, the method comprising the steps of:

- 5                   opening and closing the exhaust valves during an exhaust event;
- opening and closing the intake valves a limited amount during a portion of the exhaust event sufficient to discharge part of the exhaust gas into the intake manifold and create a mixture of exhaust gas and intake air;
- maintaining the intake valves nearly closed during a dwell period
- 10                near the end of each exhaust event to avoid valve closing and minimize valve and seat wear;
- fully opening the intake valves after their dwell periods during respective intake events drawing the mixture of exhaust gas and intake air into the combustion chambers; and
- 15                closing the intake valves at the ends of their intake events, trapping the mixture in the combustion chamber for compression, ignition and burning with reduced NOx emissions.

2. A method as in claim 1 including injecting fuel into the combustion chambers late in the expansion events of the combustion chambers to increase cylinder pressure during an exhaust blow down period.

3. A method as in claim 1 including increasing exhaust backpressure during exhaust events of the combustion chambers by restricting exhaust flow with a variable geometry turbocharger.

4. An intake cam for a diesel engine, the cam comprising:
  - a base circle;
  - a trapping lobe, a dwell portion, and a main lobe extending in sequence from the base circle;
5. the trapping lobe projecting a low height from the base circle of the cam configured to provide an associated intake valve with only a small lift during a portion of an exhaust event in an engine cycle;
- 10 the dwell portion lying adjacent the trapping lobe and projecting slightly beyond the base circle a minimum height to maintain the associated intake valve nearly closed during the dwell portion prior to the end of the exhaust cycle; and
- the main lobe lying adjacent the dwell portion and projecting a maximum height from the base circle to fully lift the associated intake valve during an intake event of an engine cycle.

5. A cam as in claim 4 wherein the base circle has an angular extent of from between 120 degrees to 200 degrees.
6. A cam as in claim 4 wherein the trapping lobe has an angular extent of from 30 degrees to 100 degrees.
7. A cam as in claim 4 wherein the main lobe has an angular extent of from 80 degrees to 160 degrees.
8. A cam as in claim 4 wherein the dwell portion between the trapping and main lobes has an angular extent of from 10 degrees to 60 degrees.

9. A cam as in claim 4 wherein the height of the trapping lobe above the base circle lies in a range of from 10 percent to 40 percent of the height of the main lobe.
  
10. A cam as in claim 4 wherein the height of the dwell portion above the base circle lies in a range of from 1 percent to 10 percent of the height of the main lobe.